

**What Is Claimed Is:**

1           1. A router circuit having a plurality of electrical input  
2 signals comprising:

3               an electrical-to-optical converter for changing the plurality of  
4 electrical input signals into a plurality of optical input signals;

5               a mixing circuit coupled to the electrical-to-optical converter,  
6 said mixing circuit generating a plurality of substantially identical  
7 composite signals corresponding to the plurality of optical inputs, said  
8 composite signals comprising at least a portion of each of said plurality of  
9 optical signals;

10              a plurality of optical bandpass filters coupled, respectively, to  
11 each one of said plurality of composite signals, said plurality of bandpass  
12 filters passing a portion of said optical signal to form a plurality of filtered  
13 signals, and

14              an optical-to-electrical converter circuit coupled to the  
15 plurality of bandpass filters, said optical-to-electrical converter converting  
16 said plurality of filtered optical signals into a plurality of respective  
17 electrical output signals.

1           2. A router circuit as recited in claim 1 wherein said  
2 plurality of bandpass filters comprises a respective plurality of center  
3 wavelengths.

1           3. A router circuit as recited in claim 2 further  
2 comprising a control circuit coupled to said electrical-to-optical converter,  
3 wherein said electrical-to-optical converter comprises a plurality of  
4 electrical-to-optical converters, said control circuit selecting a respective

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5       plurality of electrical-to-optical converter wavelengths in response to said  
6       plurality of bandpass center wavelengths.

1           4.    A router circuit as recited in claim 3 wherein said  
2       plurality of wavelengths of the electrical-to-optical converter is tunable.

1           5.    A router circuit as recited in claim 2 wherein said  
2       plurality of center wavelengths of the plurality of bandpass filters is  
3       tunable.

1           6.    A router circuit as recited in claim 1 wherein said  
2       electrical-to-optical converter comprises a plurality of electrical-to-optical  
3       converters.

1           7.    A router circuit as recited in claim 1 wherein said  
2       mixing circuit comprises at least a first plurality of mixers cross coupled  
3       with a second plurality of mixers.

1           8.    A router circuit as recited in claim 1 wherein said  
2       electrical-to-optical converter comprises a modulated tunable laser having  
3       a programmed wavelength.

1           9.    A router circuit as recited in claim 8 wherein said  
2       tunable laser is coupled to a control circuit and a temperature sensor, said  
3       control circuit tuning said laser in response to said temperature sensor to  
4       maintain the programmed wavelength.

1           10.   A router circuit as recited in claim 1 further  
2       comprising a clock circuit, said clock circuit comprising a clock electrical-

3 to-optical converter, an optical delay line and an optical-to-electrical  
4 converter.

1 11. A router circuit as recited in claim 10 wherein said  
2 optical delay line comprises an optical fiber.

1 12. A router circuit as recited in claim 1 wherein said  
2 optical-to-electrical converter comprises a photodiode.

1 13. A router circuit as recited in claim 1 wherein said  
2 mixing circuit comprises a passive star power splitter.

1 14. A satellite system comprising:  
2 said electrical inputs comprising RF inputs;  
3 a router circuit as recited in claim 1.

1 15. A satellite system as recited in claim 14 further  
2 comprising a buffer circuit receiving said plurality of RF signals, said  
3 buffer circuit synchronizing said electrical input signals within a  
4 predetermined tolerance before the router

1 16. A router circuit comprising:  
2 an electrical-to-optical converter changing electrical inputs  
3 into optical signals;

4 a first mixing circuit coupled to a first group of said plurality  
5 of optical signals, said first mixing circuit having a first output and a  
6 second output, said first output and second output each having a first  
7 composite signal comprising said first group of optical signals;

8 a second mixing circuit coupled to a second group of said  
9 plurality of optical signals, said second mixing circuit having a third output

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10 and a fourth output, said third output and fourth output each having a  
11 second composite signal comprising said second group of optical signals;

12                   a third mixing circuit coupled to said first and third outputs,  
13 said third mixing circuit generating a third composite signal comprising  
14 said first composite signal and said second composite signal;

15                   a fourth mixing circuit coupled to said second output and  
16 fourth output, said fourth mixing circuit generating a fourth composite  
17 signal comprising said first composite signal and said second composite  
18 signal;

19                   a bandpass filter circuit coupled to said third mixing circuit  
20 and said fourth mixing circuit, said bandpass filter circuit comprising a first  
21 and a second optical bandpass filter, said first bandpass filter coupled to  
22 said third composite signal for generating a first optical output and a  
23 second bandpass filter coupled to said fourth composite signal for  
24 generating a second optical output; and

25                   an optical-to-electrical converter circuit coupled to said  
26 bandpass filter circuit for converting said first optical output to a first  
27 electrical output and said second optical output to a second electrical  
28 output.

1                   17. A router circuit as recited in claim 16 wherein said  
2 electrical-to-optical converter comprises a modulated tunable laser.

1                   18. A router circuit as recited in claim 17 wherein said  
2 tunable laser is coupled to a control circuit and a temperature sensor, said  
3 control circuit controlling said laser in response to a desired router  
4 operation and said temperature sensor

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1                   19. A router circuit as recited in claim 16 further  
2 comprising a clock circuit, said clock circuit comprising a clock electrical-  
3 to-optical converter, an optical time delay circuit and an optical-to-  
4 electrical converter.

1                   20. A router circuit as recited in claim 16 wherein said  
2 optical-to-electrical converter comprises a photodiode.

1                   21. A router circuit as recited in claim 16 wherein said  
2 first mixing circuit and said second mixing circuit comprise a respective  
3 first star power splitter and a second star power splitter.

1                   22. A method of operating a routing circuit comprising:  
2                   converting a plurality of electrical signals to a respective  
3 plurality of modulated optical signals;  
4                   coupling the plurality of modulated optical signals to a cross  
5 connect switch;  
6                   forming a plurality of composite signals at a plurality of  
7 outputs of the cross-connect switch, said plurality of composite signals  
8 composed of said modulated optical signals;  
9                   converting each of the composite signals into an electrical  
10 output signal corresponding to a portion of said modulated optical signals.

1                   23. A method as recited in claim 22 further comprising  
2 synchronizing the output signal using a clock signal.

1                   24. A method as recited in claim 22 wherein  
2 synchronizing comprises delaying the clock signal an amount

3 corresponding to a delay of the cross-connect switch, to obtain a delayed  
4 clock signal.

1 25. A method as recited in claim 22 wherein converting a  
2 plurality of electrical signals to a respective plurality of modulated optical  
3 signals comprises modulating a respective plurality of diode lasers, each of  
4 which is tuned to the center wavelength of a bandpass filter.